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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/072,201 | 02/07/2002 | Hiroyuki Otaki | TJK/213 | 3764 |

26689 7590 10/07/2005

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| EXAMINER |
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ANGEBRANNDT, MARTIN J

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| ART UNIT | PAPER NUMBER |
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1756

DATE MAILED: 10/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/072,201

Applicant(s)

OTAKI ET AL.

Examiner

Martin J. Angebranndt

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-8 and 10-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4-8 and 10-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 1756

1. The response provided by the applicant has been read and given careful consideration.

Responses to the arguments of the applicant are presented after the first rejection to which they are directed. The RCE filing has been received and prosecution resumes.

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1,4-8 and 10-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 1 and 8, " $R^1_m M^1(OR^2)_n$ " should read - - $R^1_m M^1(OR^2)_n$ - -

In claims 13 and 20, " $R^1_m Si(OR^5)_n$ " should read - - $R^1_m Si(OR^5)_n$ - -

In claims 14,15, and 21, " $R^1_m Si(OR^7)_n$ " should read - - $R^1_m Si(OR^7)_n$ - -

In claims 1 and 8, " $M^2R^3_n$ " should read - - $M^2R^3_n$ - -

In claims 7 and 19, in line 3, please delete "at least one of" as only one claim is recited.

In claim 1 at line 14, the text should be - - ≥ 1 - - (it is run together in the claim, two occurrences)

In claim 8 at line 13, the text should be - - ≥ 1 - - (it is run together in the claim, two occurrences)

In claim 14 at line 9, the text should be - - ≥ 1 - - (it is run together in the claim, two occurrences)

In claim 15 at line 10, the text should be - - ≥ 1 - - (it is run together in the claim, two occurrences)

Art Unit: 1756

In claim 20 at line 13, the text should be $-- \geq 1 --$ (it is run together in the claim, two occurrences)

In claim 21 at line 11, the text should be $-- \geq 1 --$ (it is run together in the claim, two occurrences)

In claim 13 at line 13, the text should be $-- \geq 1 --$, not a backwards “E” (two occurrences)

In claim 21 “ $m+4=4$ ” should read $-- m+n=4 --$ (see similar language in claim 20)

In claims 14,15 and 21, alkoxy, epoxy, amide, sulfonyl, hydroxyl and carbonyl moieties listed for R^6 do not contain “ethylenically unsaturated bonding” as required in claims 13 or 20 for R^4 . The applicant should delete these recitation. If the applicant modifies the recitation of R^4 for claims 13 or 20 to include epoxies as an alternative to ethylenically unsaturated moieties, then the epoxy may remain in these claims.

In claims 5 and 11, 17 and 23, please replace “photo-radical” with $--$ free radical $--$.

4. Claims 6,12,18 and 24 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Ethylenically unsaturated compounds/moieties undergo free radical polymerization, not cationic polymerization. They cannot undergo cationic polymerization. Epoxide and oxetane ring containing compounds undergo cationic polymerization (see prepub at [0082])

The examiner notes that iodonium, diazonium, sulfonium, phosphonium and the cyclopentadienyl iron compounds actually initiate both cationic and free radical polymerization

Art Unit: 1756

mechanisms, but it is misleading as well to describe a photoinitiator in terms of a functionality which is incongruent with its function in the composition or the remainder of the recited composition.

If the applicant modifies the recitation of claims 1,8,13 and 20 to include epoxies as an alternative to ethylenically unsaturated moieties, then these claims may remain unchanged.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 13-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al. '771, in view of Sato et al. '846, Baney et al., "Silsesquioxanes" Chem. Rev. vol 95(5) pp. 1409-1430 and Krug et al., "Fine Patterning of Thin Sol-gel Films", J. non-cryst. Sol. Vol. 147/148 pp. 447-450, (1992).

Maeda et al. '771 teach the use of solgel processing to form useful holographic recording media, where a sol-gel processing is used to form a matrix in situ and mixed with photopolymerizable materials. Example 1 describes a silanol terminated polydimethylsiloxane, TEOS, various acrylates, a photoinitiator, where

Sato et al. '846 teach the use of silicon containing monomeric compounds in holographic recording media, specifically those which contain both free radically and cationically polymerizable materials. (see examples) Useful silicon containing cationically curable

Art Unit: 1756

compounds are disclosed (3/48-4/4). The use of cationically reactive binders is disclosed. (7/15-24). The use of silane coupling agents is also disclosed. (7/11)

Baney et al., "Silsequioxanes" Chem. Rev. vol 95(5) pp. 1409-1430 describes various techniques for forming organic/inorganic hybrid, including those containing moieties, which may be photocured, such as epoxides and vinyl moieties. (page 1426, section VB, right column)

Krug et al., "Fine Patterning of Thin Sol-gel Films", J. non-cryst. Sol. Vol. 147/148 pp. 447-450, (1992) teaches the method for forming photocurable sol-gel polymers where methacrylate monomers are reacted with alkoxides and then with other monomers.

It would have been obvious to modify the process of Maeda et al. '771 by using producing a reactive sol-gel matrix containing epoxide moieties based upon the disclosure within Sato et al. '846 that these would be compatible and that epoxide containing reactive binder are desirable in holographic recording media, using technique similar to those disclosed by Baney et al., "Silsequioxanes" Chem. Rev. vol 95(5) pp. 1409-1430 and Krug et al., "Fine Patterning of Thin Sol-gel Films", J. non-cryst. Sol. Vol. 147/148 pp. 447-450, (1992) to form the epoxide containing polymerizable matrix with a reasonable expectation of forming a useful holographic recording medium.

The applicant argues that the refractive index modulation is through the organic-inorganic hybrid polymer and argues that the resultant polymer of the invention has the desired flexibility, rigidity and heat resistance. The examiner notes that none of these properties are recited and that the use of sol-gel processes to form a more rigid matrix using materials embraced by formula 2 which prevents shrinkage and the corresponding wavelength shift and the use of coupling agents to improve the adhesion of the organic components to inorganic materials,

Art Unit: 1756

such as the sol-gel matrix is also known. These coupling agents have unsaturation in them (ie vinyl, acryl or methacryl moieties) and are embraced by formulae 1, 3 and 4 of the instant claims. These would inherently form a compound having a different refractive index from the unreacted coupling agent upon crosslinking and/or polymerization. **In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).** As the sol-gel compositions of the prior art are all solution coated, the arguments regarding that point seem to be incorrect. The applicant may have found improvements, beyond those obvious from the teachings of the references, but that is not clear at this juncture. The examiner also notes that allegations of refractive indices, which are not supported by evidence are unpersuasive. The issue of pendant shape seems to refer to an unrecited feature.

The applicant may submit declaration evidence concerning unobvious results when compared to compositions (such as those of Maeda et al. '771) where the sol gel precursor does not include a polymerizable moiety. The references are analogous, mostly dealing with sol-gel materials and establish a basis of equivalence and a reasonable expectation of the different sol-gel matrices being equivalent in function and the reasonable expectation of success in forming a useful. The ability to bond a monomer to the matrix due to the reactivity of the photopolymerizable moiety of the silane derivative and the photopolymerizable compound (and the monomer) would have been obvious to one skilled in the art and no clear benefit resulting from this is present in the record. The rigidity would be related to the degree of crosslinking in

Art Unit: 1756

the matrix, rather than the presence of the organic moiety as a side chain. The silicon compound is not limited to the case where more than one photopolymerizable moiety is present and the monomer forming the organic portion of the hybrid polymer is difunctional and so would be present in the polymeric backbone. Therefore the argued properties do not necessarily flow from the entire genus circumscribed by the claims. Due to the presence of the organic component, the same compound reacting with itself would be capable of forming a compound/particle with a different refractive index than the hybrid polymer.

7. Claims 1-8 and 10-12 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

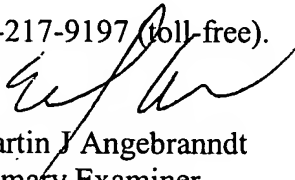
The prior art of record does not teach the combination of the claims, specifically, while the presence of the specific organic-inorganic hybrid polymer recited in the claims, the photopolymerizable compound and a photoinitiator is obvious as discussed above. The prior art does not teach or render obvious this composition where an organometallic compound of general formula 2 is added.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J Angebrannt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1756

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Martin J Angebrannndt
Primary Examiner
Art Unit 1756

09/30/2005